DOCUMENT RESUME

ED 123 557 CS 002 627

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TITLE Instructional Practices and Easy-To-Change Surrounding Conditions Variables In Effective Primary Reading Programs.
PUB DATE 76
NOTE 32p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, April 19-23, 1976)

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Primary Education; *Program Effectiveness; Program Evaluation; Reading Instruction; *Reading Programs; Reading Research; *Teaching Methods; *Teaching Procedures
IDENTIFIERS *Conditions Variables; Iowa

ABSTRACT

Dyer's (1970) model was utilized to examine instructional practices and easy-to-change surrounding conditions variables related to effective primary grade reading programs. Hard-to-change surrounding conditions variables were used in regression analyses as predictors of fourth grade reading achievement in 844 (75%) of the Iowa elementary schools; 98 schools with more effective and less effective primary reading programs were selected. Comparisons between schools revealed that in more effective schools, principals and teachers were more experienced, a public library was more available, and fewer children received their major reading instruction from the special reading teacher. (Author)

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Instructional Practices and Easy-To-Change Surrounding Conditions Variables In Effective Primary Reading Programs

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A major concern in reading research has been the determination of the kind of instructional program most effective for teaching children to read. Numerous studies have compared programs, and numerous, sometimes contradictory, findings have been reported. In an effort to coordinate a number of research projects so that any results would be generalizable to a greater variety of school settings, the Cooperative Research Program was designed. After two years, Dykstra (1968) reported much greater variance in achievement means among different projects within any one instructional method than among different instructional methods within any one project, even when reading readiness was used as a covariate.

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Dykstra concluded:

> This would indicate that the entire instructional setting is involved in the effectiveness of an instructional program in reading. Differences in method and materials alone do not appear to alter, to any great extent, the reading growth of pupils. This section of the analysis . . . points out the importance in future research of focusing on teacher and learning situation characteristics rather than methodology and materials (1968, p. 67).

Dyer (1970) has proposed a model that allows the researcher to focus on these teacher and learning situation characteristics. He has suggested that five groups of variables should be investigated: input, output, hard-to-change surrounding conditions, easy-to-change surrounding conditions, and instructional practices variables. Three groups of variables, input and hard-to-change surrounding conditions (the independent variables) and output (the dependent variable), are used in regression analyses to derive school effectiveness indices (SEI's). These SEI's are the residuals representing the discrepancy between the predicted and actual levels of performance of a school.

Once the most and least effective groups of schools have been identified the easy-to-change surrounding conditions and instructional practices are compared to identify possible reasons for the existing discrepancies.

Following Dykstra's suggestion, Hood, Leslie, and Kendall (1974) utilized Dyer's model in a pilot study. A questionnaire was sent to each elementary school principal in Iowa to gather financial and school community information (hard-to-change surrounding conditions) and information concerning instructional practices in primary grade reading programs. Third grade Iowa Tests of Basic Skills (ITBS) Reading Comprehension Test (Hieronymus & Lindquist, 1971) scores were used as the criterion variable. Complete data were available from only 212 schools (18.8%); therefore, results should be interpreted with caution.

Once the school community characteristics had been taken into account, Hood et al. found little evidence that specific instructional practices were related to reading achievement. Recency of

purchase of a new basal reader series was the only instructional practice showing a significant partial correlation with achievement, and that was negative. Two other variables had the next highest partial correlation with achievement ($p<.20$). They were the use of a single basal reader for all groups, which was negatively related, and the use of multiple series, which was positively related. Hood et al. concluded:

> The possible significance of instructional variables that describe how reading programs are used suggests that these are factors which should be investigated in a follow-up study. When sufficient numbers of schools are available it may be possible to determine whether there is an optimum pattern of use of basal reading programs which is more effective in the teaching of primary grade reading (1974, pp. 29-30).

Procedure

In the present study a two-step procedure was used to continue the search for specific instructional practices and teacher and

learning situation characteristics (easy-to-change surrounding conditions) related to effective primary grade reading programs. First, a multiple regression analysis was carried out using data available from the Iowa Department of Public Instruction (DPI) representing hard-to-change surrounding conditions (financial, community, and school characteristics) as predictors and mid-year fourth grade ITBS school means as the criterion. Schools deviating from the regression surface by more than $\pm$1.50 standard error units were chosen for further study. Input measures were not involved since data in this category were unavailable.

In the second step questionnaires were sent to the principal and to each first, second, and third grade teacher in the identified schools to gather information concerning instructional practices associated with their primary reading programs. Information from the DPI Iowa Professional School Employees Data Sheet (IPSEDS) was also obtained to determine whether certain staff characteristics (easy-

to-change surrounding conditions) differentiated principals and teachers in the more effective and less effective schools. Since the consequences of a Type II error seemed to be more serious than those of a Type I error, a level of significance of .15 was originally chosen. However, because statistical dependency existed between the questionnaire items as well as between the IPSEDS variables, a reduced level of significance of .10 was selected for comparing results (Whitney, 1971).

It might be argued that input measures should have been included in the regression analyses when selecting more and less effective schools. An input measure, such as an intelligence test or a set of Piagetian tasks, might have been obtained, but at great expense. Given the prominent role of cost/benefit analysis in educational systems today, identification of school effectiveness variables without such expense is an important consideration. Readiness test scores of the fourth graders might

have been obtained at less expense, but they were not considered appropriate for use as an input measure since such tests are often given at the end of kindergarten and so may actually reflect achievement in a portion of the primary reading program rather than knowledge separate from it. Most importantly, however, schools deviating from the regression surface will reflect both input and school effectiveness variables. When differences in instructional practices and staff characteristics in the more effective and less effective schools are examined, one can then consider whether such differences are related to input or to school effectiveness.

Identification of Schools

The regression analyses used eight hard-to-change surrounding conditions variables as predictors. The financial variable was the district elementary school tuition cost. Four variables were included to reflect socioeconomic characteristics of the community. The percent of children from low-income families was obtained from

reports filed with applications for Title I funds. Percent of Negroes, percent of Spanish, and percent of other non-Caucasian groups were the other community variables. These ethnic characteristics do not imply a limit on students' potential to achieve; rather, they are related to achievement presumably because they reflect socioeconomic status.

Three school characteristics were opening enrollment, primary grade enrollment, and primary grade growth. Opening enrollment represented a head count of each child in a school on the second Friday in September. Primary grade enrollment represented a similar count but included only grades one through three; there were 25 ungraded schools for which primary enrollment was estimated by dividing the opening enrollment of the school by the number of grades in the school and then multiplying that quotient by three. To obtain primary grade growth, the primary grade enrollment during the 1971-72 school year was subtracted from that during the 1972-73

school year and the result divided by the 1971-72 primary grade enrollment. A negative percent represented a decline in enrollment while a positive figure represented an increase.

The multiple regression program from the Statistical Package for the Social Sciences (1970) was employed to calculate the prediction equations and residuals. The reports of both the pilot study (Hood, Leslie, and Kendall, 1974) and of Skaggs (1969) suggested that there might be different relationships between the output measure and the hard-to-change surrounding conditions variables depending on school district size categories. Therefore, prediction equations and residuals were calculated within three district size categories used by Iowa Testing Programs in reporting test results: districts in the five largest communities, districts in the seventeen next largest communities, and districts in the remaining communities.

The residuals were transformed to standardized residuals, cal-

culated by dividing each residual by the appropriate standard error of the residuals. Schools that were at least 1.50 standardized residuals above their respective regression surfaces were defined as "more effective" schools; schools at least 1.50 standardized residuals below were defined as "less effective" schools.

The Questionnaires

The principal's and teachers' questionnaires were designed to explore instructional practices and easy-to-change surrounding conditions that might be related to the effectiveness of the primary reading program in the selected schools. (Copies of the principal's and teachers' questionnaires are available in Kendall, 1974, or from the first author.) The principal's questionnaire contained three sections (ten items). The first section asked which of five statements best characterized the primary grade reading program policy of the school. The second set of items referred to the special reading teacher. Principals were asked to indicate

if a special reading teacher worked in their building, whether he/she was funded by the Title I program, and how many hours per week he/she worked in their building. The third set of items asked principals to check all of the specified library facilities from which books were available for students: classroom library, building library, district library or media center, public library, and bookmobile.

The teachers' questionnaire contained four sections (14 items). In the first and second sections, teachers were asked to check the statement describing the assignment of children to their homeroom (homogeneous or heterogeneous) and to their reading classes (self-contained classroom, exchange within same grade level, exchange between different grade levels). In the third section, the degree of individualization in the reading program was explored. Teachers were asked to list the title, level, and publisher of the reader used by each reading group for the majority of their reading in-

struction or to indicate if an individualized program was used. From this information, provision for group individualization, the range of levels of materials used by the primary grade teachers, and the number of different materials used were determined. (Provision for group individualization was scored by giving points for the number of different series, different levels of readers, and different groups each teacher listed.) Teachers were also asked to specify the number of children in each reading group and the number of children who received the major portion of their reading instruction from the special reading teacher.

The fourth section investigated the supplementary reading program. Teachers were asked if they used a separate phonics program, a second reading program, creative writing, and a special free-reading time. They were asked to specify the number of minutes per week each supplementary program or technique was used and for how many children each was used (fewer than one group, one to two

groups, whole class).

Because the school (rather than the teacher) was the unit of analysis, a single representative score for each item of interest was derived from the separate teacher scores. The procedures for deriving these scores were followed only if a majority of teachers had returned questionnaires within each school (A complete explanation of procedures used for scoring principal's and teachers' questionnaires is available in Kendall, 1974.)

Staff Characteristics

Data from the Iowa Professional School Employees Data Sheet were compiled separately for principals and teachers in the more effective and less effective schools. A number of characteristics, such as undergraduate and graduate major, age, semester hours earned, and years of experience were of interest (13 for principals, 12 for teachers). A single representative score was calculated for each characteristic for the full-time primary grade

teachers in each school.

Three multiple regression analyses were performed to investigate the relationship of instructional practices and staff characteristics to school effectiveness (EFFECTIVENESS). Schools which were 1.5 standard error units above the regression surface were assigned an EFFECTIVENESS score of "1"; those 1.5 standard error units below this surface were assigned a "0". The first analysis included several variables from the teachers' questionnaire. The second analysis included information from principal and teacher Data Sheets. The third analysis combined those variables which were significant predictors of EFFECTIVENESS in the two previous analyses.

Results

The Regression Analyses

Complete data were available for 844 of 1123 (75.2%) elementary schools in Iowa that had a third grade class. Schools with missing

data on ethnic and low-income family characteristics, enrollment figures, or ITBS scores were not included. Complete data were available for 129 of 167 schools (77.2%) in districts in the largest communities (LARGE), 118 of 201 schools (58.7%) in districts in the next largest communities (MID), and 597 of 841 schools (71.0%) in districts in the remaining communities (REM).

Separate regression analyses were performed for the total group of 844 schools and for each of the three district size categories (Table 1). Because relationships were stronger within the LARGE

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Insert Table 1 about here

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and MID district size categories than for the total group of schools, three separate regression equations were used to calculate the residuals. Within each category the relationships between the dependent variable and each independent variable were examined for linearity. For any relationships which appeared to represent second degree curves, the variable(s) which appeared curvilinear were

squared and added to each of the regression equations. (For example, in the MID category, percent of Spanish and district tuition cost were squared.) In no instance did this manipulation significantly improve the prediction of achievement, and therefore the simpler linear equations were used.

The standardized residuals for 98 schools were found to be greater than ± 1.50: 13 schools (10.1%) in the LARGE category (six more and seven less effective), 14 schools (11.9%) in the MID category (nine more and five less effective), and 71 schools (11.9%) in the REM category (38 more and 33 less effective).

Due to the small number of schools in the LARGE and MID categories, expected cell frequencies were too small for X^2 analyses to be appropriately performed; however, a visual inspection of the questionnaire and Data Sheet information revealed few differences in the distributions of these variables between the more and less effective schools in the LARGE, MID, and REM categories. Further,

the standard errors of the residuals in the district size categories were found to be very similar: LARGE, 3.72; MID, 3.83; REM, 3.93. Although the amount of variance in ACHV accounted for by the hard-to-change variables was much greater in the LARGE and MID categories than in the REM, it did not appear that different kinds of variability were removed from the three categories. Rather, there was less variability in the REM schools from the beginning. For these reasons, schools were combined across district size categories for all further analyses.

For all questionnaire and Data Sheet information of a categorical nature, frequency tables were compared using chi-square tests; Yates' correction was applied for all 2X2 contingency tables. For all data of a continuous nature, means were compared using t-tests.

Analyses of Questionnaires

Usable questionnaires were returned by 85 (86.7%) principals (48 more and less effective schools). Chi-square analyses revealed no significant differences between responses of principals in more

and less effective schools to any of the questionnaire items except to the question concerning library facilities. In more effective schools a public library was available to students significantly more often than in less effective schools ($X^2 = 2.90, p < .09$).

Usable questionnaires were returned by 387 teachers (approximately 86%). All teachers returned questionnaires in 60 schools, and the majority of teachers returned questionnaires in 19 schools (47 more and 32 less effective schools). Chi-square analyses revealed no significant differences for homeroom or reading class organization, the type of reading program used (basal, language-experience, linguistic, phonic-linguistic, i.t.a.), or the use of a separate phonics program, a second reading program, or creative writing. The t-tests revealed that significantly fewer children in more effective schools received the major portion of their reading instruction from the special reading teacher than in less effective schools ($t=1.73$, $p < .09$). No other significant differences

were revealed.

Analyses of Iowa Professional School Employees Data Sheets

Data were available for principals of 96 schools (52 more and 44 less effective). Chi-square analyses revealed no significant differences between principals of more and less effective schools; t-tests revealed that principals of more effective schools had significantly more years of experience in their present district than principals of less effective schools ($t=1.68$, $p<.10$).

Characteristics of teachers in more and less effective schools were compared by t-tests; all 98 schools were included in these analyses (53 more and 45 less effective). Teachers in more effective schools had significantly more years of experience in their present district ($t=2.60$, $p<.01$) and significantly more total years of experience ($t=1.97$, $p<.05$); further, as might be expected, they were significantly older ($t=2.38$, $p<.02$) than teachers in less effective schools. No other significant differences were found.

Predicting EFFECTIVENESS

Complete data were available for 77 schools for the multiple regression analyses to predict EFFECTIVENESS. In the analysis of questionnaire data, the number of children who received the major portion of their reading instruction from the special reading teacher was the only significant predictor ($r = -.22$). In the analysis of Data Sheet information, teachers' district experience had the highest correlation with EFFECTIVENESS ($r = .26$); principal's district experience also made a significant contribution, raising the multiple R to .32. When the three significant questionnaire and Data Sheet variables were combined, only teachers' district experience and principal's district experience contributed significantly ($R = .32$).

Discussion

The characteristics which differentiated more effective and less effective schools in this study appear to be related to school

effectiveness rather than to input variables. The finding that schools with higher reading achievement have principals and teachers who are more experienced within the district is not surprising. Principals and teachers who work in a school several years are likely to become more familiar with reading materials they are using and with supplementary materials available. Their planning may improve as their awareness of the skills which are difficult for children increases. The longer the tenure in a school, the greater the opportunity to interact with the other teachers, discussing ways to improve reading instruction and following the progress of children taught during previous years. Thus the continuity and effectiveness of the reading program ought to increase with the continuity of the school's staff.

Also, principals and teachers who have been in a school for several years should become better acquainted with the families of the children in the school. Relationships between the parents and

school tend to improve, and the parents may become more aware of the reading program and how they can help their children at home. Further, as parents' attitudes toward the school improve, they are likely to communicate their feelings to their children whose attitudes toward learning may then become more positive.

Although teachers in more effective schools were found to be more experienced, how this greater experience is applied in the school setting was not clearly demonstrated. There may be a combination of instructional practices used by more experienced teachers which is reflected in the experience variable; in fact, this combination may consist of different practices at different times, depending on the group of children with whom the teacher is working. In the present study the only instructional practice which differentiated teachers in more and less effective schools was the number of children taught by the special reading teacher. Perhaps the more experienced teachers, found in the more effective schools,

send fewer children to the special reading teacher because they have learned to teach effectively the variety of children in their own classrooms.

It is surprising that none of the variables reflecting the degree of individualization in the reading program differentiated the more effective and less effective schools. Reading experts typically emphasize that methods and materials should be adjusted to fit the wide variety of children in a classroom (Schiffman, 1967, p. 138; Bond and Tinker, 1973, p. 45); Durkin flatly states, "No single set of materials is best for all children (1974, p. 12)." Although the present study followed Dykstra's suggestion and focused on how teachers use materials rather than on the materials themselves, there was no difference between the number of different materials, the range of levels of materials, or the number of groups employed by teachers in more effective and less effective schools.

Further studies investigating school effectiveness and instruc-

tional practices in reading should consider the fact that both hard-to-change and easy-to-change variables influence output. When used alone to compute expected output, results are biased in favor of the hard-to-change variables. It is further possible that some of these hard-to-change variables may also be related to instructional practices and easy-to-change variables in such a way that when they are controlled, some effects that more properly should be attributed to instructional practices and easy-to-change variables are removed. A more promising model would be one that partitioned the variance of the variables of interest as Werts (1968) has suggested so that the proportion involving interaction of hard- and easy-to-change variables could be isolated. By determining the extent to which these variables interact, researchers may be able to determine more clearly the relationships among the variables and to explain why the instructional practices for reading in some schools are more effective than in others.

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Table 1

Multiple Regression Analyses

Independent Variable	Multiple R	Increase in R^2	Beta	F
	Total Group			
Percent of Negroes	0.44	0.20	-0.27	56.23
Percent of children from low-income families	0.50	0.05	-0.28	56.83
Percent of Spanish	0.52	0.03	-0.16	28.26
Opening enrollment	0.54	0.01	-0.16	6.55
District tuition cost	0.54	0.00	0.06	3.51
Primary grade growth	0.54	0.00	0.03	1.14
Primary enrollment	0.54	0.00	0.05	0.71
Percent of other non-caucasion	0.54	0.00	0.01	0.03

Table 1 (continued)

Independent Variable	Multiple R	Increase in R^2	Beta	F
		LARGE Category		
Percent of children from low-income families	0.80	0.64	-0.89	76.67
Percent of Negroes	0.80	0.01	0.13	1.73
Percent of other non-caucasion	0.81	0.01	0.09	2.74
Percent of Spanish	0.81	0.00	-0.05	0.61
Primary Grade Growth	0.81	0.00	0.07	1.15
District tuition cost	0.81	0.00	0.02	0.17
Primary enrollment	0.81	0.00	-0.18	0.75
Opening enrollment	0.81	0.00	0.17	0.73

Table 1 (continued)

Independent Variable	Multiple R	Increase in R^2	Beta	F
		MID Category		
Percent of children from low-income families	0.61	0.37	-0.59	37.12
District tuition cost	0.62	0.01	0.13	2.85
Opening enrollment	0.63	0.01	0.08	1.08
Percent of Spanish	0.63	0.00	-0.08	1.08
Percent of Negroes	0.64	0.00	0.07	0.66
Primary grade growth	0.64	0.00	0.03	0.12

Table 1 (continued)

Independent Variable	Multiple R	Increase in R^2	Beta	F
		REM Category		
Percent of children from low-income families	0.13	0.02	-0.13	10.72
District tuition cost	0.18	0.01	0.10	6.29
Percent of Spanish	0.20	0.01	-0.10	5.84
Opening enrollment	0.21	0.00	-0.14	3.49
Primary enrollment	0.21	0.00	0.10	1.94
Primary grade growth	0.21	0.00	-0.02	0.15
Percent of other non-caucasian	0.21	0.00	-0.01	0.14
Percent of Negroes	0.22	0.00	-0.01	0.13